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Climate change adaptation in small island developing states: Insights and lessons from a meta-paradigmatic study

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ABSTRACT

This paper describes how an earlier study's novel, meta-paradigmatic approach was used to answer two research questions of international significance: *(1) How are small island developing states (SIDS) adapting to climate change at the national level? and (2) What are the factors that affect adaptation at the national level in SIDS?* As acknowledged in the 1992 United Nations Framework Convention on Climate Change and the 2015 Paris Climate Agreement, SIDS are distinct from other developing countries. They are 58 countries spread across three main geographic regions that are disproportionately vulnerable to the impacts of climate change; they require special attention and support from the international community. Previous studies using a single theory to understand adaptation in SIDS were limited and unable to fully grapple with the totality, enormity and complexity of the climate challenge. This paper argues for capitalising on the value of the distinctiveness of different theories and approaches without having to integrate them into one paradigm. It further catalogues the earlier study's contributions to climate change adaptation scholarship and theory-building. It does not seek to rationalise the earlier study or justify any theoretical perspective. Instead, it seeks to serve as an incubator for new thinking on investigating climate adaptation in complex geographies. Additionally, it teases out lessons and insights for national governments and other actors that are designing and implementing climate change adaptation policies and programs in disproportionately vulnerable countries in the Global South.

1. Introduction

The fact that the climate is changing is now the basis of global consensus—it is the "defining challenge of our era" (United Nations, 2008, online). Climate change adds "considerable stress" to individuals, social groups, communities, sectors, countries and regions (United Nations, 2016, online). From sea-level rise that increases flood risk to changing patterns of weather that threaten the production of food, its impacts are "global in scope and unprecedented in scale" (United Nations, 2016, online). Without purposeful action at the local, national, regional and international levels, "adapting to these impacts now and in the future will be far more difficult and costly", not only for today's generation but also for the next (United Nations, 2016, online).

The impacts of climate change are already being experienced by the most vulnerable countries around the world, particularly small island developing states (SIDS). Many SIDS are isolated, and environmentally and economically exposed. Chapter 29 of the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC), which focusses exclusively on small islands, concludes that, "Current and future climate-related drivers of risk for small islands during the 21st Century include sea-level rise, tropical and extratropical cyclones, increasing air and sea surface temperatures, and changing rainfall patterns" (Nurse et al., 2014, p. 1616). As many small islands are economically dependent on sectors such as tourism and fisheries, the natural system impacts will negatively affect lives, livelihoods and adaptive capacities in these countries (Nurse et al., 2014). Together, these impacts require SIDS to take urgent action to ensure their sustainability in a changing climate.

Climate change adaptation, according to AR5, is:

> "The process of adjustment to *actual or expected* climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects" (IPCC et al., 2014, p. 1758).

Adaptation is one of the two main governance approaches used to address climate change (the other being mitigation). It has two closely-related challenges: (1) adjustments to *actual* climate and its effects, and (2) adjustments to *expected* climate and its effects (Rutherford et al., 2016). The AR5 definition also suggests that adaptation not only includes physical adjustments (as per those required in natural systems) but also political, social, economic and institutional adjustments, as per

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those required in human systems (Rutherford et al., 2016). Javeline (2014) argues that the most pressing adaptation questions do not entirely relate to science but to the interaction of political, environmental, social and economic domains – behaviour and the institutions that facilitate or hinder such behaviour. This suggests that adaptation in human systems is as important as adaptation in natural systems and could even be more pressing, at least in the short term.

National SIDS governments are prioritising climate change adaptation action in order to ensure their sustainable development (Robinson, 2017b). While there have been substantial improvements in the ability and accuracy of climate science to predict and provide relevant data, which has led to a better understanding of the impacts in natural systems, including zonal shifts and the impact of ocean acidification on coral reefs (see e.g. Schmutter et al., 2017), the information base is limited and generally not useful for national policy- and decision-making. This shortcoming is problematic for SIDS, given their heavy dependence on climate-sensitive sectors such as tourism and fisheries. A better understanding of the physical, ecosystem and local socio-economic vulnerability associated with climate change is essential for driving the conversation toward effective adaptation policy- and decision-making at various scales. Despite the importance and urgency of this, there is little evidence in the academic literature about how SIDS, as a group and spread across three different geographic regions, are adapting to climate change. Previous studies using a single theory to understand adaptation in SIDS were limited and unable to fully grapple with the totality, enormity and complexity of the climate challenge. Further, institutional change is not likely to occur until first, the impact of climate change on climate-sensitive sectors in SIDS is fully understood, and second, the challenges associated with mounting adequate, effective and/or sustainable institutional responses to climate change in SIDS are fully grasped and addressed.

This paper describes how an earlier study's novel, meta-paradigmatic approach was used to answer two research questions of international significance: *(1) How are SIDS adapting to climate change at the national level? and (2) What are the factors that affect adaptation at the national level in SIDS?* These questions are important because SIDS have been earmarked for special attention and support from the international community and tracking adaptation progress along with its drivers and barriers can have insights for understanding the adequacy, effectiveness and/or sustainability of internationally-supported actions. This paper further catalogues the earlier study's contributions to climate change adaptation scholarship and theory-building. It does not seek to rationalise the earlier study or justify any theoretical perspective. Instead, it seeks to serve as an incubator for new thinking on investigating climate adaptation in complex geographies. This paper also teases out lessons and insights for national SIDS governments and other actors that are designing and implementing climate change adaptation policies and programs in disproportionately vulnerable countries in the Global South.

2. Materials and methods

2.1. SIDS as a unit of analysis

Using SIDS as a unit of analysis is contentious. The SIDS classification is largely a political construct grounded in the advocacy efforts of the Alliance of Small Island States in the United Nations and in various international policy documents such as the 1992 United Nations Framework Convention on Climate Change (UNFCCC; also referred to as The Convention) and the 1994 Barbados Programme of Action for the Sustainable Development of SIDS, which reiterate the 'special' case of SIDS in terms of environment and development. There is, however, no consensus in the academic literature on how SIDS should be defined; definitions and parameters vary. The United Nations Office of the High Representative for the Least Developed, Landlocked Developing Countries and the Small Island Developing States (UN-OHRLLS) unofficially lists 58 SIDS located in one of three geographic regions, namely the Atlantic, Indian Oceans, Mediterranean and South China Seas (AIMS), Caribbean and Pacific (see Table 1). Mysiak et al. (2015) argue that listed SIDS may neither be small, developing nor islands. So while the classification includes countries that share common challenges, including narrow resource bases, small domestic markets, rapid urbanisation and population growth, and fragile environments, they are different in many respects but also provide the basis for a common unit of analysis (UN-OHRLLS, 2011).

Table 1
List of Small Island Developing States by Region.
(Based on UN-OHRLLS, 2011)

AIMS (N = 9)	CARIBBEAN (N = 29)	PACIFIC (N = 20)
Bahrain	Anguilla	American Samoa
Cape Verde	Antigua and Barbuda	Cook Islands
Comoros	Aruba	Federated States of Micronesia
Guinea-Bissau	Bahamas	Fiji
Maldives	Barbados	French Polynesia
Mauritius	Belize	Guam
Sao Tome and Principe	Bermuda	Kiribati
Seychelles	British Virgin Islands	Marshall Islands
Singapore	Cayman Islands	Nauru
	Cuba	New Caledonia
	Curacao	Niue
	Dominica	Northern Marianas Islands
	Dominican Republic	Palau
	Grenada	Papua New Guinea
	Guadeloupe	Samoa
	Guyana	Solomon Islands
	Haiti	Timor-Leste
	Jamaica	Tonga
	Martinique	Tuvalu
	Montserrat	Vanuatu
	Puerto Rico	
	Sint Maarten	
	St. Kitts and Nevis	
	St. Lucia	
	St. Vincent and the Grenadines	
	Suriname	
	Trinidad and Tobago	
	Turks and Caicos Islands	
	United States Virgin Islands	

2.2. Research design and questions

The earlier study, which was undertaken between 2014 and 2017 and which produced five peer-reviewed articles (see Section 4), used a mixed methods approach. It drew more heavily on qualitative methods and, therefore, had a strong qualitative component—Johnson and Onwuegbuzie et al., 2004, p. 14), for example, view a mixed methods approach as a "natural complement" to qualitative research. This approach supports the uncovering of contextual and contemporary data (as opposed to historical data)—it is evidence-based and future-oriented, lending itself to highlighting lessons from and for climate change adaptation in SIDS in different regions. The earlier study's mixed method approach was also based on a multiple case study design—three case studies (i.e. various samples of SIDS grouped according to each of the three geographic regions) were nested within one case study (i.e. all SIDS – up to 50 of the 58 SIDS identified by UN-OHRLLS). Though case knowledge is just as valuable as general theoretical knowledge (Gerring, 2004), the approach has been criticised for providing little scientific rigour and basis for scientific generalisation (Yin, 2003). As a result of this, it was combined with quantitative methods in order to increase the robustness of the earlier study. Fig. 1 shows an illustrated summary of the research design.

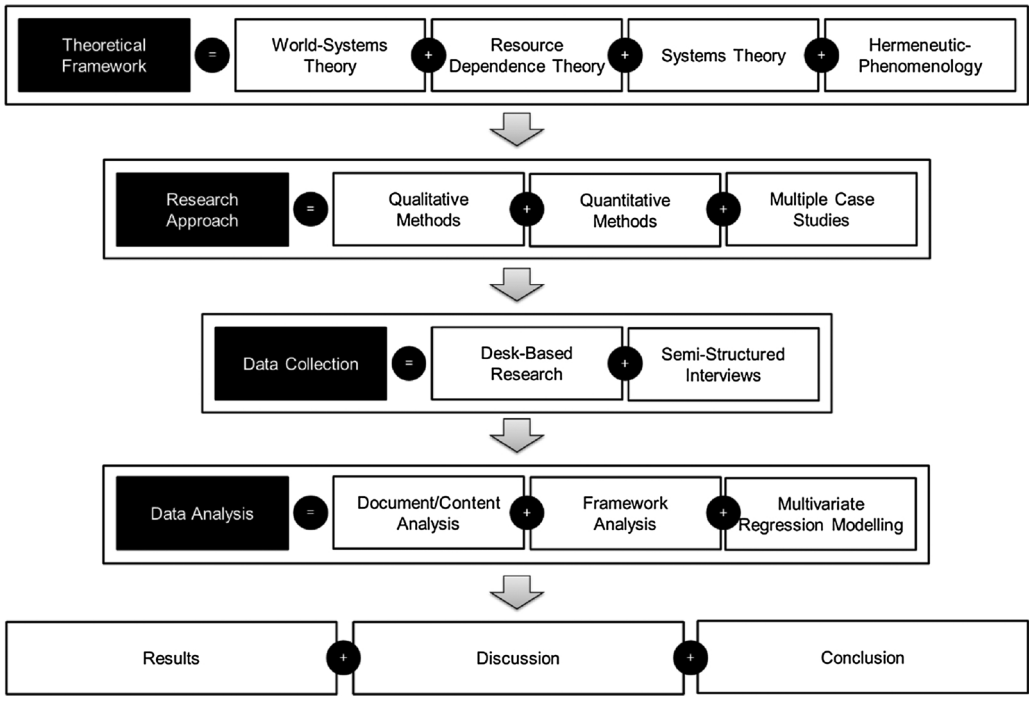

Fig. 1. Illustrated Summary of the Research Design.
(Source: Author).

The earlier study aimed to answer two primary research questions: *(1) How are SIDS adapting to climate change at the national level? and (2) What are the factors that affect adaptation at the national level in SIDS?* These questions are important because SIDS have been earmarked for special attention and support from the international community and tracking adaptation progress along with its drivers and barriers can have insights for understanding the adequacy, effectiveness and/or sustainability of internationally-supported actions. The earlier study also used insights from the existing academic literature and the answers to the first primary research question to develop eight additional research questions, which then became sub-questions of the second primary research question (see Box 1).

2.3. Data collection and analysis

The earlier study collected qualitative data through desk-based research and face-to-face or Skype®-based interviews with 65 senior national and regional climate change, environment and development officials. Desk-based data were derived from National Communications (NCs) to the UNFCCC and other adaptation policy-relevant documents. UNFCCC State Parties share their climate action progress through NCs (Lesnikowski et al., 2015). The interview subjects were officials from two Caribbean SIDS (Jamaica and St. Lucia), three Pacific SIDS (Fiji, Samoa and Tuvalu), and regional organisations such as the Caribbean Community Climate Change Centre (CCCCC), The Pacific Community (SPC) and the Secretariat of the Pacific Regional Environment Programme (SPREP). Interviewees were selected by purposive sampling. One topic guide was developed for national officials and another for regional officials. The 65 interviews elicited the diverse range of perspectives sought.

Conceptual content analysis techniques were used to analyse the adaptation-related documents, including the NCs (following Duraiappah and Bhardwaj, 2007). With respect to NCs, however, the approach primarily focused on counts and comparisons of phenomena in the data. Interviewee responses were manually coded and analysed using framework analysis techniques, which facilitated the identification and discussion of major and minor themes in the data (see Lacey and Luff, 2007).

In order to identify the determinants of international adaptation financing flows to SIDS (see Factor No. 1 in Box 1), data for up to the year 2014 were collected from the Organisation for Economic Co-operation and Development's (OECD) open access Creditor Reporting System, World Bank, specialised United Nations agencies, and national statistical offices. Multivariate regression modelling was used to analyse the data collected—this statistical method "estimates a single regression model with more than one outcome variable" (IDRE, 2017, online). Up to 12 models were developed based on an extensive review of the academic literature. Ordinary least squares and Tobit models were also used to estimate unknown parameters in the linear models along with the linear relationships between the short-listed predictor variables.

3. The meta-paradigmatic approach

Given the totality, enormity and complexity of the climate challenge, particularly in the context of SIDS, the earlier study took a meta-paradigmatic approach to theory-building and application (following Gioia and Pitre, 1990). This approach "recognises the value of the distinctiveness of each individual theory and the value of exploring zones where theories overlap or can inform each other, but does not try to integrate everything into one paradigm" (Termeer et al., 2013, p. 36). The theories and approaches selected – world-systems theory, resource dependence theory, systems theory, and hermeneutic-phenomenology (see Fig. 2) – have been previously applied to issues of collective logic and action, decision-making, and individual and institutional/organisational adaptations, making their application to the earlier study appropriate. Each theory or approach is distinctive and offers a value that should be capitalised on; yet, each has its own strengths and weaknesses. In some instances, they overlapped or conflicted and this was unavoidable.

3.1. World-systems theory

World-systems theory was used to understand the position of SIDS in the geopolitical system. According to the theory, there are three main

Box 1
List of Research Questions

(Source: Author)

Primary Research Questions:

1. How are SIDS adapting to climate change at the national level?
2. What are the factors that affect adaptation at the national level in SIDS?

Research Sub-Questions (formulated based on insights from the existing academic literature combined with the answers to the first primary research question above; together, they answer the second primary research question):

Factor No 1: The volume of and access to international adaptation financing

2.1. What are the trends in international adaptation financing to SIDS?
2.2. What are the determinants of international adaptation financing to SIDS?
2.3. What are the experiences of SIDS with international climate change adaptation financing?

Factor No. 2: The effectiveness of regional organisations

2.4. Are regional organisations effective in coordinating climate change adaptation responses in SIDS?

Factor No. 3: The existence of adaptation mainstreaming drivers and barriers

2.5. What are the drivers of climate change adaptation mainstreaming in SIDS?
2.6. What are the barriers to climate change adaptation mainstreaming in SIDS?
2.7. How can climate change adaptation mainstreaming be practically achieved in SIDS?

Factor No. 4: The existence of adaptation limits

2.8. What is the nature and potential range of climate change adaptation limits in SIDS?

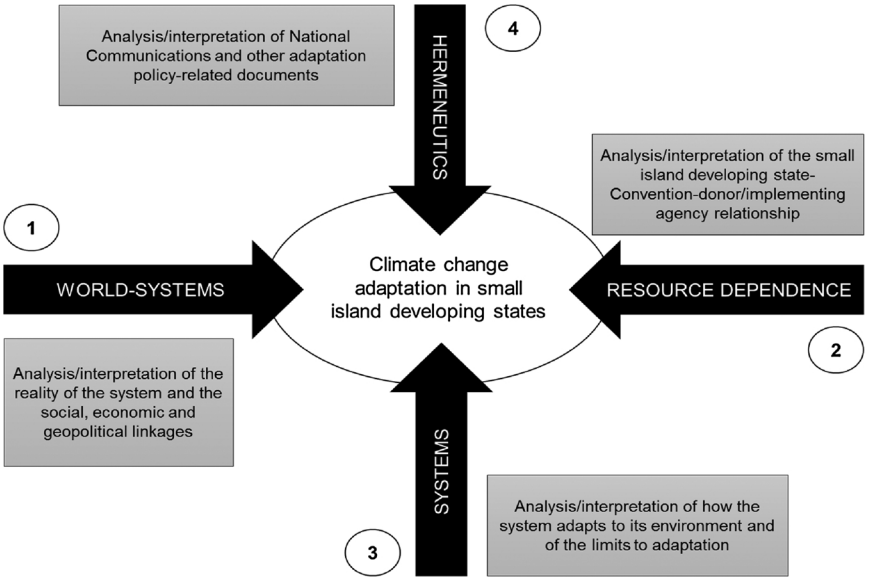
Analysis/interpretation of National Communications and other adaptation policy-related documents
HERMENEUTICS
4
Analysis/interpretation of the small island developing state-Convention-donor/implementing agency relationship
1
WORLD-SYSTEMS
Climate change adaptation in small island developing states
RESOURCE DEPENDENCE
2
Analysis/interpretation of the reality of the system and the social, economic and geopolitical linkages
SYSTEMS
3
Analysis/interpretation of how the system adapts to its environment and of the limits to adaptation

Fig. 2. Schematic of the Earlier Study's Theoretical and Methodological Framework. (Source: Author).

zones in the modern world – a core, periphery and semi-periphery (Hobden, 2011). Countries in the core are those developed nations that benefitted from "accelerated industrialisation at the expense of countries in the periphery" and have higher levels of greenhouse gas (GHG) emissions (Gagliardi, 2013, online). Countries in the periphery are those developing nations, including SIDS, that are "less economically developed", are "largely dependent on agriculture and other forms of natural resource extraction", and have "the fewest resources to adapt to climate change" (Mayhew, 2015; Merrett, 2008, pp. 1110 & 1111). Countries in the semi-periphery are emerging economies that are "more economically diverse" than core countries but with lower levels of emissions and development (Merrett, 2008, p. 1111).

This theory highlights the inequality between and the (co-)dependencies of the core and periphery (Warf, 2010)—ultimately, climate change is "related to global inequality and the global stratification of power and influence" (Gagliardi, 2013, online, also Roberts and Parks, 2006). This inequality explains the differences in resources, governance quality and development trajectories across the zones. SIDS have historically been disadvantaged in the world-system, a position that is now exacerbated by climate-related slow and rapid onset events; further, SIDS have contributed least to global warming but "will suffer the most harm" (Merrett, 2008, p. 1111).

3.2. Resource dependence theory

Resource dependence theory was used to explore the relationship between national SIDS governments and donors, and to understand how governments, as organisations, adapt to their specific and general environments. The theory posits that an organisation:

1 Is "subject to external control when it depends on its external environment for a large proportion of a critical resource, such as funding" (Mitchell, 2014, p. 70);
2 Responds to the demands of organisations and actors exogenous to it because of its dependence on their resources (Chorev, 2012; Jones, 2010); and
3 Aims to "minimise its dependence on other organisations" and to "exert influence over other organisations so that it can obtain resources" (Aquinas, 2008, p. 57).

National SIDS governments operate within a global framework for climate action and aim to fulfil their Convention obligations, including the submission of NCs. The earlier study argued that governments agree to be bound by the UNFCCC because they are dependent on the financial and technical resources available through its architecture. Chorev (2012, pp. 24 & 25) points out that the extent of the dependence varies according to a number of factors, including the "amount of external funds required for operation" and "competition with other organizations for access to resources". Additionally, national SIDS governments aim to influence their environment for the greatest benefit (Jones, 2010). This can occur through "inter-organizational partnering" (Malatesta and Smith, 2014, p. 14). Common partnering strategies such as alliance formation are reflected in regional-level cooperation on adaptation through the CCCCC, SPC and SPREP, for example. Dornan and Newton-Cain (2014, p. 541) call it "regional service delivery" through which national governments can increase their access to resources and maximise adaptation outcomes.

3.3. Systems theory

Systems theory was used to analyse how human systems (i.e. national SIDS governments) adapt or adjust to their specific and general environments. This theory is premised on the idea that "most patterns in social life […] reflect the structure of a relationship, organization, society" and "offers a framework for interpreting modern society" (Lechner, 2000, pp. 113 & 114). In addition to theorising that the system is ever-evolving into a complex state of perfection, the earlier study also recognised that there are limits to the extent to which the system can adapt. This coincides with the positions of Adger et al. (2009) and Inderberg and Eikeland (2009), for example, that argue that there are social, cognitive, political and other limits to adaptation. These are "endogenous" to the society and hence, contingent upon a number of other factors, including "ethics, knowledge, attitudes to risk and culture" (Adger et al., 2009, p. 335). While a number of indigenous adaptation measures have been implemented to address physical change in SIDS over the years (see discussions in e.g. Albert et al., 2017; Hiwasaki et al., 2015), there is a recognition that the mobilisation of action within an institutional framework requires information and an appreciation of the inherent risk to move beyond political inertia that must be overcome in order to effectively adapt to climate change.

3.4. Hermeneutic-phenomenology

Hermeneutic-phenomenology was used to analyse NCs and other adaptation-related policy documents. On the one hand, hermeneutics can be seen as an "art of interpretation" with "transformative possibilities" that is "especially suitable for work of a textual and interpretive nature" (Kinsella, 2006, p. 1). A hermeneutic approach embraces the analysis of policy-relevant texts (Yanow, 2007, p. 114), including documents such as NCs, interview transcripts and field notes. This allows researchers to isolate themes in the texts in an effort to "make sense" of the data collected (Sloan and Bowe, 2014, p. 1292). On the other hand, phenomenology evolved in an effort to arrive at "situation-specific interpretations of the meaning(s) of human acts" (Yanow, 2007, p. 112), and emphasises the inter-connectedness of the "lived experience, and historical or social contexts" (Standing, 2009, p. 20) as well as the importance of paying attention to underlying meanings rather than the actual words of subjects (Yanow, 2007). This approach was appropriate because adaptation is highly contextual and, as a result, lived experiences vary.

4. Results and discussion

The earlier study produced five peer-reviewed articles (see Table 2). This section shows how the findings across the five publications contribute to climate change adaptation scholarship and theory-building. It also teases out insights and lessons for national SIDS governments and other actors designing and implementing climate change adaptation policies and programs.

Table 2
Summary of Research Outputs.
(Source: Author).

No.	Article Title	Research Question(s) Answered*	Research Output
1	Climate change adaptation trends in SIDS	1	Robinson (2017b)
2	International financing for climate change adaptation in SIDS	2.1, 2.2, 2.3	Robinson and Dornan (2017)
3	Regional organisations and climate change adaptation in SIDS	2.4	Robinson and Gilfillan (2017)
4	Mainstreaming climate change adaptation in SIDS	2.5, 2.6, 2.7	Robinson (2017c)
5	Climate change adaptation limits in SIDS	2.8	Robinson (2017a)

* See Box 1 for the list of research questions.

4.1. Contributions to climate change adaptation scholarship

4.1.1. Adaptation trends

Analysing the NCs of 16 SIDS, the results in Robinson (2017b) showed that, despite their disproportionate vulnerability, SIDS reported undertaking far more observation and assessment activities (28% of actions) than any other adaptation-related activity. For Lesnikowski et al. (2015), such activities constitute 'groundwork' actions and are not 'actual' adaptation. However, investing in ongoing, localised climate research is important. New research by Taylor et al. (2018) shows different climate impacts in the Caribbean with 2 °C of global warming vs 1.5 °C of global warming. While this further strengthens the argument for downscaled modelling in island geographies and for the consequent development of evidence-based policies and programs, there is uncertainty regarding the extent to which this is already being done. Saxena et al. (2018) point to insufficient translation of the Paris Agreement's temperature targets into local adaptation project designs. Using Caribbean SIDS as a case study, they find that current adaptation project designs are based on a general (and not region-specific) understanding of the science, as is presented in Taylor et al. (2018), for example. This has the ability to negatively impact the pursuit and achievability of climate resilience and transformation in SIDS regions.

Although many adaptations in SIDS can be classified as observation and assessments, this ought to be seen as laying the groundwork for more evidence-based adaptation. A critical component of this is engagement in monitoring and evaluation (M&E) activities. The evidence in Robinson (2017b) shows that only 7% of actions reported by SIDS can be classified as M&E. While low levels of M&E are also reported in other jurisdictions (see e.g Dannevig et al., 2012; Saito, 2013) and are perhaps expected in a SIDS context, given their financial and technical resource limits, the gap between these and implementation and management (21%) is significant (see Robinson, 2017a,b) and more M&E is needed. However, where limited implementation is being undertaken, the results will also be limited. The progression must, therefore, go from sound vulnerability assessments to adaptation planning to implementation and then to M&E. In order to achieve this, the recommendation of Gupta (2010) is applicable here. The authors make a case for single- and double-loop learning. It is important that institutions (in this case, national governments, as organisations) learn from past experiences and demonstrate institutional changes in order to boost their adaptive capacities. However, in the case of dynamic climate change, past experiences are not always reliable frameworks for transformative action.

4.1.2. Adaptation financing

Besides national governments, Robinson (2017b) found SIDS reported bilateral donors and development banks being the most involved in national-level climate adaptation action. Robinson and Dornan (2017) unpacked this finding. The authors analysed OECD adaptation financing to 50 SIDS between 2010 and 2014 and found that roughly US$2 billion was committed across all sectors. The authors also found that SIDS status (as opposed to African or least-developed country status) is a determinant of financing but how climate vulnerability is measured impacts the volume of financing a SIDS can expect to receive. Using Germanwatch's Climate Risk Index (CRI), which measures historical vulnerability, the authors found that a SIDS can expect to receive US$140–$180 million more, on average, than an identical non-SIDS country (Robinson and Dornan, 2017). Combining the CRI with the University of Notre Dame's Global Adaptation Index, which measures future vulnerability, the authors found that a SIDS can expect to receive US$50–$60 million more (Robinson and Dornan, 2017). In some respects, the difference in these results validates the caution expressed in Barnett et al. (2008) regarding the 'hazards' of quantitatively measuring vulnerability. However, a closer examination of donors' choice of vulnerability and equity indicators, the extent to which it suits a country's local circumstances, and the impact the choice ultimately has on the volume of financing a SIDS can expect to receive is needed. Work by Persson and Remling (2014) on the Adaptation Fund, for example, contributes to this discourse, as does work by Saxena et al. (2018), for example, which calls for more clarity around how the Green Climate Fund (GCF) defines and measures a project's potential to bring about transformational change.

Robinson and Dornan (2017) found that countries with smaller populations, although receiving less total adaptation financing, receive more per capita financing. This is consistent with trends in 'regular' development aid (see e.g. Feeny and McGillivray (2010)). Whether small island economies are under- or over-aided has been a contentious issue in the broader aid allocation literature. Authors such as Aiyar (2008) argue that they are over-aided; Feeny and McGillivray (2010, p. 897) concede that flows to these countries are "enormous", given their small size; McGillivray et al. (2010) posit that SIDS have the highest levels of aid vis-à-vis their national incomes. This should not suggest, however, that the volume of adaptation financing provided to SIDS is sufficient or excessive. Policy-makers report financing as an adaptation limit (see Robinson, 2017a). And if the deflator is vulnerability or even more so vulnerability relative to GHG emission levels, it is likely that SIDS would very much be underfunded. Additionally, international adaptation financing levels are consistently well below pledged amounts and commitments do not equal actual disbursements (UNEP, 2017). This has led to calls for increased mobilisation and support for the Paris Agreement's 'enhanced transparency framework', which should reduce discrepancies in international adaptation financing accounting (see Weikmans and Roberts, 2017).

4.1.3. Regional organisations

The results in Robinson (2017b) showed that, besides bilateral donors and development banks, regional (i.e. supranational) organisations are most involved in national-level adaptation action in SIDS. Robinson and Gilfillan (2017) explored the effectiveness of three case study organisations in the Caribbean and Pacific – CCCCC, SPC and SPREP – in coordinating adaptation across SIDS. They found that these organisations are most effective in terms of their adaptation-related inputs and outputs; the organisations are, however, least effective in terms of their implementation and management of adaptation projects and programs, despite being tasked with this responsibility (Robinson and Gilfillan, 2017). This raises questions not only about the suitability of these organisations, as they are currently structured, positioned and resourced, for implementing adaptation projects and programs but also the sustainability of them coordinating national and sub-national adaptation action from the regional scale. On the one hand, national SIDS governments are dependent on the adaptation support provided by regional organisations (Dornan and Newton-Cain, 2014). Interview data presented in Robinson and Dornan (2017) suggest that SIDS policy-makers see these organisations as drivers of SIDS' access to international adaptation financing, especially microstates such as Cook Islands and Nauru that have even more limited resources. It is an essential role to facilitate and focus on areas of common concern across SIDS, including sea-level rise, coastal zone management, water resources and agriculture, while at the same time understanding the uniqueness of individual island states in terms of geology, demographics, and economic base. Regional organisations can and should provide expertise and technical support that moves beyond acquiring funds. This includes bringing global change models to regional scale and assisting with overlays for individual SIDS as well as with as providing expertise in planning, implementation and management. On the other hand, the "discontent of a growing number of island states with the established regional order" is fuelling the emerging importance of sub-regional organisations in the Pacific, for example (Tarte, 2014, p. 312). In some respects, SIDS policy-makers also see regional organisations as barriers to full access to international adaptation financing. Regional organisations deduct around 8% of international adaptation funds to cover their administrative costs (Robinson and Dornan, 2017). This deduction is

viewed by SIDS policy-makers as monies being diverted away from on-the-ground actions that could help increase countries' adaptive capacities (Robinson and Dornan, 2017). This suggests that the terms on which regional organisations are engaging in adaptation may be contentious and may require re-evaluation in order to maximise mutual benefit.

4.1.4. Adaptation mainstreaming

Only 2% of adaptation action in SIDS, Robinson (2017b) found, is classified as 'mainstreaming' or the continuous integration of climate change considerations into development policies and programs. On the one hand, this low uptake is surprising, given the recognition of mainstreaming's synergy-creating potential (see Gupta, 2010; Klein, 2010), and given the multitude of factors that are driving the process in SIDS, including policy development and political leadership, the work of climate 'champions' and informal networks, and the extent of island exposure and sensitivity to climate impacts (Robinson, 2017c). On the other hand, it is not surprising as the barriers in SIDS are many and include competing development priorities such as poverty and external debt reduction, poor planning and governance, and insufficient manpower and human resources (Robinson, 2017c). Additionally, new research by Runhaar et al. (2017), which reviewed 140 mainstreaming case studies, found lagging implementation, while Saito (2013) previously reported suboptimal results in non-SIDS developing countries. Robinson (2017c) further flagged varying conceptualisations of mainstreaming among SIDS policy-makers. Some see it as integrating adaptation and mitigation and others see it as integrating adaptation and disaster risk reduction. Policy-makers further contend that before adaptation or adaptation mainstreaming can be tackled these and other critical development challenges need to be first addressed (see Robinson, 2017c). This brings into question the appropriateness or utility of mainstreaming as an adaptation policy in SIDS and whether a new approach is required. This aside, it is often the case that NCs and national adaptation policies and strategies, despite the effort given and momentum generated, are shelved and their implementation becomes secondary to meeting the immediate development needs of the country. In order for climate change adaptation in SIDS to be effective, it should be mainstreamed into disaster risk reduction, coastal zone management, water resources management, and sustainable agriculture and fisheries. Only when climate change is seen as an impediment to the primary productive sectors such as tourism and fisheries will it be given the seriousness it deserves.

4.1.5. Adaptation limits

The results in Robinson (2017b) showed that, despite their disproportionate vulnerability, only 21% of adaptation action in SIDS can be classified as implementation and management. Robinson (2017a) investigated the factors limiting this type of action in SIDS, analysed the NCs of 19 SIDS, and concluded that 39% of reported limits are institutional, 29% are physical and ecological, 16% are economic, 14% are social, and 3% are technological. These results highlight a number of tensions. First, there are tensions over what counts as an adaptation limit and the difference between an adaptation limit and an adaptation barrier. Robinson (2017a) argued that not all limits can be justifiably classified as such and that the difference between a limit and a barrier is negligible. In a small island context, Barnett et al. (2013), for example, caution against conflating the two. Second, there are tensions between scholarly and local accounts of the limiting role of physical and ecological factors vis-à-vis institutional factors. Works such as Nunn et al. (1999) and Veitayaki (2010) have long suggested the limiting nature of islands' physical and ecological characteristics in adaptation. Besides Robinson (2017a), however, few studies have aimed to understand the impact of institutional deficiencies on adaptation action in SIDS. The results suggest that these are potentially the strongest drivers of climate change adaptation limits in SIDS. Third, there are tensions over whether there is adequate recognition of the role of social and cultural factors in limiting adaptation in SIDS. Authors such as Adger et al. (2009) and Duncan (2008) emphasise these factors and the importance of understanding how they work as both drivers of and barriers to adaptation. While resolving these tensions is outside the scope of this paper, the findings regarding adaptation implementation and management are not significantly different from non-SIDS jurisdictions. In the United States, for example, despite a long history of coastal management, a recent study of coastal States revealed that effective action to deal with sea-level rise in coastal management plans was slow to develop and that major coastal cities such as Miami and New York only recently began taking more concrete actions to address their vulnerabilities to sea-level rise and coastal inundation (see London, 2017). Notwithstanding this, more research is needed to deconstruct correlation and causation with respect to limits and adaptations in SIDS.

4.2. Contributions to theory-building

The earlier study presented evidence that suggests that world-systems theory is consistent with how SIDS policy-makers view their country's position in the geopolitical system (see Robinson and Dornan, 2017). Based on findings across the five publications, however, the theory does not sufficiently account for the inequality within zones or what could be termed 'intra-zones'. Without a doubt, core countries have a distinct capitalist advantage despite the theory being critiqued for "representing the global economic system as a predominantly capitalist phenomenon" (Warf, 2010, p. 3135). Ultimately, climate change is "related to global inequality and the global stratification of power and influence" (Gagliardi, 2013, online). While the inequalities between zones are more apparent, the inequalities within zones are less so. Robinson and Dornan (2017) highlighted the skewed nature of international adaptation financing allocations across SIDS between 2010 and 2014. Globally, a few SIDS received the most: 10% of the 50 SIDS considered accounted for 51% of all commitments, leaving 90% of SIDS to share 49% (Robinson and Dornan, 2017). This disparity in access has implications for financial and human resource availability, governance quality, and the implementation of adaptation actions. Where it concerns governance quality (as measured by the World Governance Indicators [WGI]), the authors found that SIDS with higher governance qualities generally received more commitments, though the opposite was also true. Cape Verde, with an average WGI score of 1.62 (1st of the 47 SIDS with a score), received the most commitments of all SIDS – 13% of total commitments; Haiti, with an average WGI of −1.14 (46th) received the third most commitments – 10% of total commitments (Robinson and Dornan, 2017). These realities have implications for how countries interact within the world-system. They also demonstrate the need for the theory to examine 'intra-zone' inequality and the resulting impact on climate action and/or inaction.

The findings across the five publications also shed light on the nature and patterns of national SIDS governments' dependence on external resources, as espoused by resource dependence theory. Interviews in Robinson (2017c) and Robinson and Dornan (2017) suggested that national SIDS governments continue to acquiesce to donor demands because of their need for financial support as well as their view that donors are morally obligated to finance adaptation in their countries. Despite being burdened by donor-related obligations, Pacific policy-makers cited the volume of paperwork required as part of international funding applications as exacerbating the existing human resource constraints (Robinson and Dornan, 2017). This aside, SIDS are in fact asserting their responsibility for financing adaptation. Tuvalu, for example, has established a Climate Change and Disaster Survival Fund and planned to contribute the local equivalent of approx. US$1.5 million to grow the Fund in 2017 (Government of Tuvalu, 2016). The creation of such funds by national SIDS governments support the new paradigm ushered in by the Paris Agreement that calls for increased climate action from both developed and developing country Parties. These national funds also allow SIDS to increase their autonomy in their

specific and general environments, which supports resource dependence theorists' argument that organisations are aiming to minimise their dependence on external organisations.

One of the five publications, in particular, challenged the role of historical ties in defining dependence, though Robinson and Gilfillan (2017) characterised an emerging dependence on regional organisations such as CCCCC, SPC and SPREP. Despite dependence being historically understood in terms of colonial relationships, Robinson and Dornan (2017) found that ex-colonies do not receive significantly more adaptation financing from metropolitan States than developing countries that were never their colonies, though France is an exception. This runs contrary to the normative behaviour of aid flows from developed to developing countries—work by Armstrong and Read (2000); Bertram (2004); Mawdsley (2012) and others in the aid allocation literature contend that the volume and flow of development aid are shaped by colonial relationships that influence economic outcomes in recipient countries. This, however, does not negate the existence of colonial-like relationships with respect to the provision of international adaptation financing, which can exacerbate dependence. Australia, for example, committed the most adaptation financing (48%) to Pacific SIDS over the period studied (Robinson and Dornan, 2017); it also has a complicated, quasi-paternalistic history with the region (see Fraser, 2014; Hawksley, 2009). These findings, however, do not negate the increasing importance of neo-colonial relationships with the GCF and other multilateral funds to SIDS.

4.3. Lessons for national SIDS governments

Across all five publications emerging from the earlier study, governance developed as a central theme, which suggests that this should be an area of focus for national SIDS governments. Robinson (2017a) found that 39% of adaptation limits in SIDS can be classified as institutional. Interviews in Robinson (2017c) revealed poor governance and corruption as two of the main adaptation mainstreaming barriers in SIDS. Conversely, improvements in governance are important for practically achieving mainstreaming, which previous guides such as SPREP and UNDP (2013) and UNDP and UNEP (2011) do not sufficiently emphasise. The seven-step process proposed in Robinson (2017c) is underpinned by three key principles – cooperation and communication, financial sustainability and innovation – which must be built into climate change adaptation governance architectures in order for national mainstreaming efforts to be effective. In spite of these considerations, Robinson (2017b) found that most adaptations in SIDS are not institutions-related—adaptations typified as planning, institutions and policies accounted for 19% of actions. These findings suggest that: (1) national SIDS governments have the agency to change their own adaptation and development trajectories, (2) adequate, effective and/or sustainable adaptations can also be internally-driven, (3) there are limits to the extent to which externally-controlled financial resources can facilitate the realisation of what should be internally-driven institutional objectives, and (4) SIDS applying for international adaptation financing should seek earmarked funds for building their adaptive capacities, placing special emphasis on overcoming institutional constraints. In asserting their agency in this regard, SIDS will require accurate data about their climate-, climate-related and non-climate-related vulnerabilities, including on the nature of the interrelationships between the economy and society that may be adversely affected by climate change. Given their overlapping and interconnected vulnerabilities, it will be essential that the right signals are sent to implement effective adaptation strategies and to encourage sustainable development patterns and trajectories in SIDS.

4.4. Lessons for non-governmental and private sector actors

In the context of the interviews undertaken as part of the earlier study, a sense of powerlessness was pervasive among SIDS policy-makers—Caribbean policy-makers, for example, expressed concern that their 'small voice' in the international arena was impacting their ability to attract their fair share of international adaptation financing and to undertake the adaptations that are required to support climate-compatible development planning (see Robinson, 2017c; Robinson and Dornan, 2017). In theory, this should signal opportunities for non-governmental and private sector actors to 'step up' and support national-level adaptations in SIDS. However, Robinson (2017b) showed that there is a big gap in the involvement of these actors, only participating in 14% and 7% of actions, respectively. Notwithstanding this, the Church is active in Pacific adaptations, which Betzold (2015) also highlights. In the Caribbean, this is less so the case. With Jamaica, for example, said to have the most churches per square mile, this is potentially a missed opportunity for instituting local adaptation networks. In terms of mobilising domestic private adaptation finance, Hess and Kelman (2017, p. 33) suggest that there are "several promising revenue mechanisms" that can be tapped to promote sector-based adaptations but that appropriate government frameworks are needed to support this scale of action. This, again, points to the critical importance of improved governance structures to enable adequate, effective and/or sustainable adaptation in SIDS.

5. Conclusion

The earlier study was one of the first cross-regional analyses of national-level climate change adaptation in SIDS in the academic literature. Its novel, meta-paradigmatic approach facilitated the identification or development of (1) cross-regional trends in adaptation actions, (2) the determinants of international adaptation financing, (3) a framework for assessing the effectiveness of regional organisations coordinating adaptation, (4) a seven-step process for practically achieving adaptation mainstreaming, and (5) the nature and potential range of adaptation limits in SIDS. Many of the findings uncovered were unexpected and, in some instances, contradicted established SIDS narratives. Other findings, while not as unexpected, provided strong evidence to support conclusions drawn in other bodies of literature, or those drawn against anecdotal evidence.

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